The values of nutrients showed stepwise distribution patterns along the north-south sections. Going to south their concentrations increased sharply around the fronts, namely the Subtropical Convergence, the Subantarctic Front and/or the Antarctic Polar Front. In the areas between the fronts the minimal changes in the concentrations were observed. Silicate concentration increased abruptly from less than 2 μM to more than 30 μM at the APF. Linear trends between phosphate and nitrate concentrations were found whose slopes were different depending on the regions divided by the SAF.

The continuous records of the nutrient distribution across the APF were obtained for the first time. The nutrients showed obvious changes in their concentrations at the front. Silicate value, in particular, jumped from 1 μM to 30 μM within a distance of 10 km.

Around 61°S in the Antarctic Polar Frontal Zone silicate concentration decreased significantly, while water temperature and salinity changed little. The decrease in silicate concentration might be attributed to biological uptake of the nutrient after ice melting. (p. 23–42).

DISTRIBUTION AND CHEMICAL COMPOSITION OF PARTICULATE ORGANIC MATTER IN THE PACIFIC SECTOR OF THE ANTARCTIC OCEAN

Eiichiro TONOUE

Particulate matter was collected from the surface through deep water layers at nine hydrographic stations along 116°E and 150°E in the Pacific sector of the Antarctic Ocean. The particulate matter was analyzed for organic carbon, total nitrogen, amino acid, carbohydrate and lipid contents.

Average particulate organic carbon concentrations ranged from 59.7 to 118 μgC/l in the surface layers with values tending to decrease with depth to a range of 16.1–54.1 μgC/l in the deep layers along both longitudes. The values obtained in the present study are lower than those reported in the most productive oceanic areas, but several times higher than those reported in low latitude areas. The values are comparable to those reported in middle latitude areas of the Pacific and Atlantic Oceans.

The percentages of amino acid-, carbohydrate- and lipid-carbon in the particulate organic carbon were determined. Sums of these three components in the surface layer were 63.8–88.3%, and the values decreased to 48.8–69.4% in the intermediate layer and 36.1–59.9% in the deep layer. The percentages of amino acid- and lipid-carbon in the particulate organic carbon increased as one moved farther south to areas where dichothermal waters were clearly observed. Significantly high percentages of amino acid-carbon in the particulate organic carbon were found for the particulate matter suspended in the water layers above the cold water layers, while high values more than 35% were obtained for the particulate lipid in the cold water layer and just below the cold water masses. It can be concluded that protein rich particulate matter is distributed above the cold water masses, while lipid rich particulate matter is localized in the cold water masses. Mechanisms by which these characteristic distributions of the chemical compositions were produced are discussed. (p. 43–57).